2024
B.A./B.Sc.
Second Semester
CORE – 3
CHEMISTRY
Course Code: CHC 2.11
(Organic Chemistry - I)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five questions, taking one from each unit.

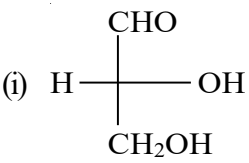
UNIT–I

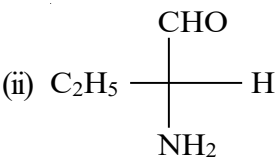
1. (a) Write the IUPAC name of the following compounds: 1×3=3
   (i) $H_3C - CH = CH - COOH$
   (ii) $H_2C = CCl - CH = CH_2$
   (iii) $CH_3 - C(CH_3)_2 - CH_2 - CH_3$
   (b) Out of formic acid and acetic acid, which is stronger acid and why? 3
   (c) Explain homolytic fission and heterolytic fission with example. 4
   (d) Give one example for each of the following species: 1×4=4
   (i) Neutral electrophile
   (ii) Neutral nucleophile
   (iii) Free radical
   (iv) Ambident nucleophile

2. (a) Define hybridization. Write the type of hybridization of each of the carbon atoms in the given structure $CH_3 – CH = CH – CH_3$. 2+2=4
   (b) Benzyl cation is more stable than ethyl cation. Explain. 3
   (c) Differentiate between S_N1 and S_N2 reaction. 4
   (d) Explain addition reaction with example. 3

UNIT–II

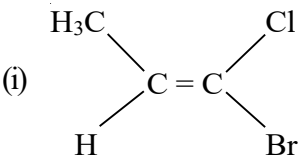
3. (a) Assign R, S-configuration to the following compounds: 1×2=2

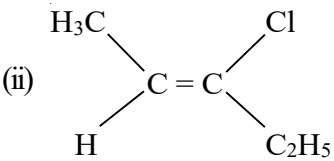
(i) 

(ii) 

(b) What is geometrical isomerism? What are the conditions for a compound to exhibit geometrical isomerism? 2+2=4

(c) Write the CIP-rule to assign E-Z notation. Assign E-Z notation to the following compounds: 2+2=4

(i) 

(ii) 

(d) Differentiate between relative configuration and absolute configuration. 4

4. (a) Explain Newman and Sawhorse projection formulae giving an example each. 3+3=6

(b) How will you resolve a Racemic mixture by biochemical method? 3

(c) Write short note on syn-anti isomerism. 3

(d) Using tartaric acid, show the conversion for Newman (staggered) projection to Fischer projection. 2

UNIT–III

5. (a) Complete the following reactions: 1×2=2

(i) $CH_3 - CH_2 - CH_2 - OH + \text{Conc. } H_2SO_4 \xrightarrow{160°C-170°C}$

(ii) $CH_3 - CH = CH_2 + Br_2 \xrightarrow{500°C-600°C}$

(b) Explain free radical reaction mechanism of halogenations of methane. 4

(c) Give chemical reaction, what happens when $CH_2 = CH - CH = CH_2$ (1,3 butadiene) is treated with bromine in

(i) Non-polar solvent

(ii) Polar solvent in acidic medium 2+2=4

(d) Write the reaction mechanism of benzylic bromination of toluene. 4

6. (a) Explain the following name reaction with mechanism: 3×2=6
   (i) Wurtz reaction
   (ii) Oxymercuration-demercuration reaction
   (b) Differentiate between E_1 and E_2 elimination reaction. 4
   (c) Suggest a reasonable mechanism for the transformation of: 4

$$CH_3 - CH = CH_2 + HBr \xrightarrow{\text{peroxide}} CH_3 - CH_2 - CH_2 - Br$$

UNIT–IV

7. (a) Give reason why: 3×2=6
   (i) Acetylene is more acidic than ethylene and ethane.
   (ii) Alkynes undergo nucleophilic addition reaction, but alkenes do not.
   (b) Using Baeyer strain theory, calculate angle strain in cyclopentane and cyclohexane. 2+2=4
   (c) Draw the different conformation of n-butane (Newmann projection) and show which one is most stable. 4

8. (a) Discuss Baeyer's Strain theory to explain the relative stability of cycloalkane. 4
   (b) Complete the following reactions: 2×3=6

   (i) $CH_3C \equiv CCH_3 + Br_2 \xrightarrow{\text{carbon tetra chloride}}$

   (ii) $CH_3C \equiv CCH_3 + 2HBr \longrightarrow$

   (iii) $HC \equiv CH + CH_3OH \xrightarrow{\text{heat}}$

   (c) Give the reaction mechanism of hydration of acetylene. 4

UNIT–V

9. (a) Explain the following with reaction mechanism: 4×2=8
   (i) Sulphonation of benzene
   (ii) Freidel Craft's alkylation

(b) What is Hückel's rule? What do you understand by the term aromatic, non-aromatic and anti-aromatic? 3

(c) Toluene is nitrated more readily than benzene. Explain. 3

10. (a) Give reason why: 3×2=6

(i) –OH groups on aromatic substitution with electrophilic reagent is -ortho and -para orienting.

(ii) Chlorobenzene directs the incoming electrophile to -ortho and -para position although chloro-group present in the ring deactivates the ring.

(b) Explain the Freidel-Craft acylation with reaction mechanism. 4

(c) Give the chemical structure of the following and predict their aromaticity: 1×4=4

(i) Pyridine

(ii) Pyrrole

(iii) Cyclopropene

(iv) Thiophene